Patent Application of Franklin Zhigang Zhang

for

TITLE: Internet Based Time Distributed Message Network System and Personal Mobile Access Device

CROSS-REFERENCE TO RELATED APPLICATIONS

This application claims the benefit of the Provisional Patent Application Ser.No. 60/251,644 filed 12/06/2000.

BACKGROUND – FIELD OF INVENTION

This invention relates to wireless Internet networking system and devices, specifically to an innovation of Internet based ultra wide area network communication system and devices.

BACKGROUND – DESCRIPTION OF PRIOR ART

It is known in the art of wireless Internet networking, normally people refer it to WAP technology, and/or cellular phone system with Internet browsing and email function. These kinds of wireless Internet are cellular phone technology dependent, in another word; they can only be used wherever [[there is cellular phone communication system]] <u>cellular phone communication system is available</u>. The function and feature are limited by cellular technology. With these technologies, when one user needs to send email to another user, he needs to send the message from his cellular phone to cell site, and then through cell phone carrier's circuit to a public email server system. The email server delivers the messages to the destination email server and finally reaches the email receiver.

However, in the art of cellular phone communication, the links between user's handsets and cell sites are limited, once one user is connected, others cannot use the same channel until the prior cellular phone gets off the line. And the current cell phone technology does not have enough bandwidth to carry video signal (3G WAP technology will carry some video function). Long distant roaming of the handset is very costly and complicated. This makes remote video communication very difficult.

IP telephony [[is hot today]] <u>is getting more popular</u>. A lot people try to utilize the IP technology to cut down the cost of long distant calls. [[But by compromising itself to]] <u>However, in order to be compatible with</u> the conventional telephone system, expensive gateway equipments need to be set up, [[and also to maintain the QOS is very hard]] <u>and, it is very hard to maintain the QOS.</u> [[There are also difficultly in the convenience of use; billing issues are almost unsolvable]] <u>It is not convenient to use IP telephony, and billing issues are complicated</u>.

[[The long distant videoconference is almost impossible due to the bandwidth limitation, except some dedicated line users]] <u>Except some dedicated line users, long distant videoconference is almost impossible due to Internet bandwidth limitation</u>. It is even harder for the IP telephony to maintain the QOS when using videoconference.

Currently there are also some low end products such as net meeting and net2phone. Because of varies of the networking topology and bandwidth, the QOS is very unstable and sometimes is too poor to be acceptable. Nonetheless, there are always personal computers needed in the IP telephony and videoconference. The

coordination between two users in order to establish IP telephony and videoconference
is difficult and very inconvenient. Because personal computers (including notebook computers) cannot be easily moved around with people while connected to the internet, [[the IP telephony and videoconference cannot be widely used as the cellular phone]] IP telephony and videoconference via PC cannot be as widely used as the cellular phone.

Summary

A revolution invention of wireless Internet networking system comprises an Internet based Time Distributed Message Network (TDMN) system and Personal Mobile Access Device (PMAD). Every Personal Mobile Access Device (PMAD) has a global unique ID number. All information exchange is carried on in between the PMADs, [[in another word,]] with the Internet based Time Distributed Message Network (TDMN) system guarantees the data exchange between the PMADs. The PMAD sends and receives the Time Distributed Data Message Units (TDMUs). The PMAD also packs and unpacks data into TDMU format before transmission and after received. The present invention adopts time-distributed technology based on TCP/IP and Internet. It overcomes the disadvantage of the variety variation of the Internet bandwidth, and makes a very good use of the Internet, the largest global network. The PMAD can easily roam globally without paying long-distant legacy long distance communication fee. Internet based TDMN [[system conspires of TDMN Domain and multiple APs]] system comprises of TDMN Domain and a plurality of APs, which are connected to the TDMN Domain via Internet connection.

Objects and Advantages
Accordingly, several objects and advantages of my invention are:
1) to utilize the whole Internet as a low cost giant message interchange system;
2) to provide a boundaryless roaming communication;
3) to provide a complete Internet based data, audio, video message communication system.
4) to provide high quality digital wireless internet communication system;
5) to overcome the inconsistent data communication via the internet;

6) to provide very high quality video/voice data communication based on the TDMU protocol;

7) to provide end-to-end communication infrastructure without any message lost;

8) to provide a system with stand-by service feature when the receiver PMAD is not on line;

9) to provide an ultra low cost global roaming communication system based on current internet infrastructure, any of the transmitters or receivers PMADs [[have the same high quality and as fast as they are connected through the internet at any place]] has same high quality of communication as long as it is connected to Internet;

10) to provide low gain PMAD for less RF pollution to the environment, less RF hazard to the human beings users;

11) [[to provide low cost ,ease setup access point thus to provide full coverage of the PMADs]] to utilize low cost and easy setup wireless access point to provide much coverage for the PMADs.

12) better RF channel and resource usage, compared to cellular phone technology.

The forgoing features and advantages of the present invention can be appreciated more fully from the following description, with references to the accompanying drawings in which.

Brief Description of the Drawings

Fig. 1 is a block schematic diagram of a system and method of Internet Based Time Distributed Message Network (TDMN) system and Personal Mobile Access Device (PMAD) of the present invention showing the network architectures of Time Distributed Message Network (TDMN) Domain, local internet link, Access Point, Personal Mobile Access Device (PMAD) and notebook computer.

Fig. 1A is a schematic block representation of the hierarchy of the Time Distributed Message Network (TDMN) domain of the present invention.

Fig. 1B is a schematic block representation of the Host Domain of the Time Distributed Message Network (TDMN) of the present invention.

Fig. 1C is a schematic block representation of the Control Domain of the Time Distributed Message Network (TDMN) of the present invention.

5

Fig. 1D is a schematic block representation of the Access Domain of the Time Distributed Message Network (TDMN) of the present invention.

Fig. 2 is a function block diagram illustrates the design of an AP of the present invention and it's its connections.

Fig. 3 is a function block diagram shows the design of the Personal Mobile Access Device (PMAD) of the present invention.

Fig. 4 is a schematic representation of multiple Personal Mobile Access Devices (PMADs) communicating with each other of the present invention.

[[SUMMARY

A revolution invention of wireless Internet networking system comprises an Internet based Time Distributed Message Network (TDMN) system and Personal Mobile Access Device (PMAD). Every Personal Mobile Access Device (PMAD) has a global unique ID number. All information exchange is carried on in between the PMADs, in another word, the Internet based Time Distributed Message Network (TDMN) system guarantees the data exchange between the PMADs. The PMAD sends and receives the Time Distributed Data Message Units (TDMUs). The PMAD also packs and unpacks data into TDMU format before transmission and after received. The present invention adopts time-distributed technology based on TCP/IP and Internet. It overcomes the disadvantage of the variety of the Internet bandwidth, and makes a very good use of the Internet, the largest global network. The PMAD can easily roam globally without paying long distant communication fee. Internet based TDMN system conspires of TDMN Domain and multiple APs, which are connected to the TDMN Domain via Internet connection.]]

DESCRIPTION-Preferred Embodiment

Fig.1 is a schematic diagram of the system and method of Internet Based Time Distributed Message Network (TDMN) system and Personal Mobile Access Device (PMAD) of the present invention. As shown, the Time Distributed Message Network (TDMN) system comprises a TDMN Domain 10 and multiple Access Points (APs) 20A, 20B. The TDMN Domain is connected to internet 11 via the internet link 109. The AP 20A, 20B are connected to internet 11 via internet link 110A and 110B, so that they are connected to the TDMN Domain 10 via internet connection 109. The Personal Mobile Access Device (PMAD) 30A, 30B connect to AP 20A, 20B. By control of the TDMN Domain 10, the PMAD 30A can establish two links to the PMAD 30B. There are: security virtual data link 112 and virtual communication data link 113.The TDMN system can ~~adopt~~ accommodate multiple PMADs; each of the PMADs has a unique ID number. In this embodiment, the TDMN system is ~~adopting~~ accommodating three PMADs: 30A, 30B and the notebook computer 105, which is running PMAD simulation software. Each of them has ~~a~~ an unique PMAD ID. The PMAD also has a wired connection port, which can be used to connect to other computing device; the PMAD 30A is connecting to the notebook 106 using a wire connection 107.Thus the PMAD 30A and the notebook 106 can work together to share the computing power and resource.

Fig. 1A shows a schematic block representation of the hierarchy of the Time Distributed Message Network (TDMN) Domain 10 of the present invention. The TDMN Domain 10 is a Host Domain 101 with Internet connection 1101. At the next level of the domain hierarchy is the Control Domain 102, which has an Internet connection 1102. The further next level of the domain hierarchy is the Access Domain 103, which has an Internet connection 1103. A Host Domain 101 may comprise multiple Control Domains 102. A Control Domain 102 may comprise multiple Access Domains 103. As shown, all the Domains have their own Internet connections, thus, all the Domains are connected together via Internet.

Fig. 1B is a schematic block representation of the Host Domain 101 of the Time Distributed Message Network (TDMN) 10 of the present invention. In this embodiment, the host server 1011 is a computer that has a powerful computing power and data storage system. The host server 1011 has an Internet connection 11011. As shown,

the Host Domain 10 may comprise multiple Node Servers 1021 which have internet connections 11012. These entire servers are connected together via internet connections. The Host server 1011 will perform as a central server, and manage the activities of the other servers 1021 in the same domain.

Fig. 1C is a schematic block representation of the Control Domain 102 of the Time Distributed Message Network (TDMN) of the present invention. In this embodiment, a Control Domain 102 comprises multiple Control Servers 1031 that have internet connections 11021, and one Node Server 1021 that has a internet connection 11012. The Node Server is the central server that manages the activities of the Control Servers 1031.

Fig. 1D is a schematic block representation of the Access Domain 103 of the Time Distributed Message Network (TDMN) 10 of the present invention. In this embodiment, a Access Domain 103 comprises multiple Access Servers 1032 that have internet connections 11031, and one Control Server 1031 that has a internet connection 11021. The Node Control Server is the central server that manages the activities of the Access Servers 1032. The Access Servers 1032 are the edge servers of the TDMN Domain 10. The Access Points (AP) 20 is connected to Access Servers 1032 via Internet connection.

Fig. 2 is a function block diagram illustrates the design of an AP 20 of the present invention and it's its connections. The radio unit 202 is a wireless networking radio and is capable to communicate with the radio of the Personal Mobile Access Device (PMAD) 30. The antenna 201 of the AP 20 can be different with from the antenna of PMAD 30. But they are both low gain antennas, and will not cause big electromagnetic wave pollution. So, the cell size 40A (see in Fig.4) of the AP is a lot smaller than that of the regular cellular phone system. The internet connection port 204 of AP 20 can connect AP 20 to internet 11 via internet connection 110, which can be cable modem, ADSL modem, or other type of internet connection. In order for the PMAD 30 to associate to it and communicate with other PMADs, an AP 20 needs to be connected to an Access Domain 103, which is connected to internet via the connection 11031. AP 20 also has a LAN port 203, which can be connected to a

LAN 205, allowing the AP and the devices on the LAN sharing the internet connection 110.

Fig.3 is a function block diagram shows the design of the Personal Mobile Access Device (PMAD) of the present invention. The PMAD 30 has a wireless networking radio unit 301 and antenna 302, which is capable to communicate with the radio unit of Access Point (AP)20. The CCD unit 303 is the video input device for the PMAD 30. The PMAD 30 also has a pair of voice devices, which are speaker 304 and microphone 310. LCD touch screen 307 can be used to display any video and data information, and data input device. The PMAD 30 also has a wired port 309 which can be connected to a person computer and/or other device to share the wireless connection to AP 20. The control buttons 305 is used to control the message collect/replay and transmit/receive. For example, when PMAD 30 is working at voice mode, the control button 305 can control the record and replay of the voice message. It can be used to control the CCD unit 303 to take a picture and send the picture to the remote receiver. (Another PMAD). The LED display section 306 can prompt the communication status of the PMAD 30, such as, it blinks when there is incoming message, ~~The wireless~~ the wireless link status with AP, and, any on going operation. The feature function control buttons section 308 works like the computer hot key to trigger the different operation of PMAD 30.

Preferred Embodiment – Operation

A PMAD (30) joins in the TDMN when it is physically within the communication range of the Access Point (20). Upon verifying the ID and usage configuration of the PMAD (30) with the TDMN server, AP (20) grants the joint of network to the PMAD (30). The AP (20) announces the ~~present~~ presence of the PMAD (30) to the TDMN (10). When any PMAD (30) presents to the TDMN (10), the TDMN (10) allows the PMAD (30) to send and receive TDMU. The TDMN (10) can store the TDMUs for a particular PMAD (30) when this destination PMAD is not present to the TDMN (10), and, distribute the stored TDMUs to that PMAD (30) when it is presence to the TDMN (10) next time.

The TDMN technology of this invention encodes and packs the voice and video message (or other data) into multiple Time Distributed Message Units (TDMUs) at the

sending PMAD. The TDMN system guarantees these TDMUs reach the destination PMAD completely. The receiving PMAD re-assembles and decodes the TDMUs into original data format, and runs the corresponding applications.

Fig. 1 Operation

End user applications are running on the PMADs 30A, 30B, 105. The applications include user interaction, communication management and application control. Each PMAD's communication management and application control setting information are also stored in the TDMN Domain 10. The TDMN Domain 10 and APs 20A, 20B manage the TDMU to be transmitted and received among the PMADs 30A, 30B. The TDMN Domain 10 and Aps 20A, 20B also guarantee the security and QOS of the links for the end users. The PMADs communication management and application control include the contact list, QOS setting, data security setting and etc. There are always two virtual links can be established to allow the PMADs to communicate to each other. These two virtual links are: virtual control and security data link 112 and virtual communication data link 113. While the PMADs are roaming, the actual link inside the TDMN system may vary; the two virtual links can always be established. Once the virtual link is created, the two or a group of the PMADs remain virtually connected. The virtual link will be torn down when the particular PMAD is not presence to the TDMN system, and it needs to re-establish the virtual link before it can communicate with other PMADs. As shown in the current embodiment, the PMADs 30A and 30B are connected together via two virtual links 112 and 113. Both PMADs 30A and 30B are ~~presence~~ present to the TDMN system. The PMAD 30A connects to the TDMN system via the wireless link 111A to the AP 20A, which reports the presence of the PMAD 30A to the TDMN Domain 10. The PMAD 30B connects to the TDMN system via the wireless link 111B to the AP 20B, which reports the presence of the PMAD 30B to the TDMN Domain 10. Both one of the PMADs 30A or 30B can start to call the other one, and the operation causes the TDMN system to establish a virtual control and security data link 112, and a virtual communication data link 113 between the PMAD 30A and 30B. If one of PMADs 30A and 30B is not presence to the system, then, there is not virtual link can be established from end to end. The waiting message can be stored in the TDMN

system or the PMAD itself by the control of the default setting of the properties of each PMAD, until the virtual links are established again.

Fig. 4 Operation

Fig. 4 is a schematic representation of multiple Personal Mobile Access Devices (PMADs) communicating with each other of the present invention. In this embodiment, there are four APs (20A, 20B, 20C, 20D) connecting to TDMN Domain 10 via internet connections (110A, 110B, 110C, 110D). These APs (20A, 20B, 20C, 20D) are at different locations with different wireless coverage cells (40A, 40B, 40C, 40D). Among which, AP 20A and 20B are at wireless adjacent area. As shown, the PMAD 30A is performing a roaming from location 40A to 40B and 40C, while talking to PMAD 30D at location 40D. Because 40A and 40B are adjacent of two cells, the AP 20B automatically takes over the connection when the PMAD 30A enters its wireless cell. The roaming of the PMAD 30A(30A') from 40A to 40B keeps the virtual links that connect to the PMAD 30D; in another word, the communication remains active while the roaming of the PMAD 30A from 40A to 40B. When the PMAD 30A'(30A") roams from 40B to 40C, because 40B and 40C are not adjacent of two cells, the PMAD 30A' will lost the connection to the TDMN system for a certain time and then the re-joint the TDMN system via its connection 111C' to AP 20C. Under this circumstance, the PMAD 30A" needs to be re-established the virtual links to the PMAD 30D to continue the communication.

Also as shown in the embodiment, the PMAD device 30B, 30C, 30D are performing group communication. The group virtual links need be established by the TDMN system.

Thus, in accordance with this invention, it is now possible to utilize the internet as cost effective global wide area network backbone to form the TDMN system. Via wireless connections to the APs 20 of the TDMN network, the PMAD 30 may establish the virtual links, thus to perform one to one or one to group two-way data communications.

Conclusion, Ramifications, and Scope

It can be seen that, according to the invention, I have provided an Internet Based Time Distributed Message Network (TDMN) system and Personal Mobile Access Device (PMAD). All the PMADs can have high quality communication to each other via Internet and TDMN. The TDMN and TDMU mechanism ensure no information loss, which is unachievable by the conventional cellular technology. The present revolutionary invention provides high quality voice, video, data global roaming communication at ultra low cost.

Furthermore, the TDMN system and the PMAD device have additional advantages in that:

- to overcome the unmanageable two-way continuously communication quality of service (QOS) of Internet communication and TCP/IP technology. In the prior art, it is very hard to maintain QOS of Internet, because of the variety of the bandwidth and the unpredictable of the Internet traffic.
- to eliminate the unpredictable time delay and/or the TCP/IP package damage, thus no message will be distorted by the time factor, which is caused by Internet communication.
- Have ultra low cost and very high growing network coverage alone the growth of the Internet.
- Majority of the wireless communication between AP and PMAD is using wireless LAN technology. This provides high efficient of RF usage, low RF pollution to environment, and less RF hazard to human compared to cellular phone technology.

Although the description above contains much specificity, these should not be construed as limiting the scope of the invention but as merely providing illustrations of some of the presently preferred embodiments of this invention. Various other embodiments and ramifications are possible within it's scope. For example:

- A non-wireless device can run the same feature to join in the TDMN and simulate the PMAD function, and communicate with the other PMAD.

- A small scale TDMN may be running in some certain location to provide the service to its own PMADs. In this scenario, simpler TDMN can also achieve the goal.
- A PMAD may be used as Internet access gateway for the computer.
- A PMAD may be as simple as just providing two-way voice communication, without complicated full feature. So, the PMAD design may be different.
- TDMUs may be exchanged on top of non-TCP/IP networking protocol.
- TDMUs may be used to carry encrypted messages, to provide high-secured communication among PMADs.
- A group of PMADs may communicate with other group of PMADs instead of one to one.

Thus the scope of the invention should be determined by the appended claims and their legal equivalents, rather than by the examples given.

Claims: What is claimed is:

Claim 1-15 (cancelled)

16 (new). A system of Internet based time distributed two-way personal mobile communication, comprising:

    one Time Distributed Message Network (TDMN) running on Internet;

    a plurality of wireless Access Points (APs) connecting to Internet;

    a plurality of Personal Mobile Access Device (PAMD);

    Wherein said TDMN is a group of server means operating on Internet;

    Wherein said wireless Access Point (AP) is a wireless networking device;

    Wherein said PAMD is personal mobile communication device with user and media interfaces;

    Wherein said PAMD also has wireless networking means to communicate with said APs;

    Wherein said PAMD comprising operational means to join said TDMN for communication via Internet connection;

    Wherein one of said a plurality of PAMD is communicating with remote other one of said a plurality of PAMD via said TDMN;

    Wherein said communication among said a plurality of PAMD is time distributed;

    Wherein said TDMN manages communication among said a plurality of PAMDs; and

    Wherein said TDMN and said a plurality PAMDs running correspondent operation means for joining network and communication.

17 (new) The Time Distributed Message Network (TDMN) of claim 16, wherein said TDMN comprising TDMN operation means:

    Whereby, said TDMN operation means storing the undelivered message when the communication of receiving PAMD to said TDMN is interrupted; and

Whereby, said TDMN operation means continue delivering said undelivered message when the interrupted communication of said receiving PAMD to said TDMN reestablishes.

18 (new) The Time Distributed Message Network (TDMN) of claim 16, wherein said TDMN comprising Access Domain and Core Domain and TDMN operation means;

wherein said Access Domain comprising a plurality of Access Servers (AS) connecting to Internet;

wherein further said Access Servers are connecting to a plurality of Access Point (APs) of claim 16 via Internet;

wherein said Core Domain managing the communication among Access Domains;

wherein said Core Domain comprising servers with Internet connections;

wherein said TDMN operation means managing the operation of said TDMN and a plurality of PAMDs of claim 16; and

wherein said TDMN operation means manage the message communication among said PAMDs in time distributed method;

19 (new) The PAMD of claim 16 comprising data packaging means of package data information into message units, and, transmit and receive the said message units via Internet and the TDMN of claim 16,

wherein transmitting and receiving of said message units is time-distributed, and

wherein said data packaging means package data source into a plurality of Time Distributed Message Units (TDMUs).

20(new), The PAMD of claim 19, comprising:

means to convert the data resource to be transferred in to TDMU;

means to convert the received TDMU into original data format; and

means to control the communication with other PAMD of claim 19.

21 (new). The system of Internet based time distributed two-way personal mobile communication of claim 16, wherein a plurality of PAMDs of claim 16 can perform group communication.

22 (new). Method of time distributed two-way mobile message communication over Internet according to claim 16 comprising:

operating TDMN of claim 16, wherein said TDMN operation means control the access of a plurality of PAMDs of claim 16, wherein TDMN manage the communication among said PAMDs, wherein said TDMN operation means ensures message exchange among said PAMDs;

having first of said a plurality of PAMDs networking wirelessly to one of a plurality APs of claim 16 to establish Internet connection and then join said TDMN,

having second of said a plurality of PAMDs networking wirelessly to one of said a plurality of APs to establish Internet connection and then join said TDMN,

establishing communication between said first and second PAMD via said TDMN, and

communicating messages among said first and second PAMD via said TDMN.

23(new) The method of claim 21, whereby TDMN store all the undelivered messages for the receiving PAMD when the communication of said receiving PAMD with said TDMN is not available, and whereby said TDMN continue to delivery said stored messages to said receiving PAMD when said receiving PAMD re-establishes communication with said TDMN.

24(new) The method of claim 21, wherein said message communication among said first and second PAMD via TDMN is on time distributed method

25(new) The method of claim 21, wherein TDMN operation means guarantee the sending and receiving of messages among the a plurality of PAMDs.

26(new) The method of claim 21, wherein PAMD packages source date into TDMU of claim 19 to transmit and receive among PAMD and TDMN over Internet.

27 (new). Method of group time distributed two-way mobile message communication over Internet according to claim 22, wherein a plurality of PAMDs of claim 16 joining an operating TDMN of claim 16 performing group communication among each other.

Internet Based Time Distributed Message Network System and Personal Mobile Access Device

Abstract:

An Internet based Time Distributed Message Network (TDMN) system and the Personal Mobile Access Device (PMAD) access the system to perform one to one or one to group two-way voice/video and data communications between/among PMADs. The present invention encodes and packs the original voice/video and data information into Time Distributed Message Unit (TDMU). The TDMN system routes the TDMU from the sender PMAD to receiver PMAD. To do this, the TDMN system forms two virtual links (virtual control and security data link, virtual communication data link) to connect the sending and receiving PMADs. When all TDMUs of one operation reach the destination PMAD, the receiving PMAD decodes and reassembles them into the original data format, and runs the corresponding applications. Because the TDMU transmission and reassembly are time distributed, the shortage of the Internet transmission cannot affect the transmission and the reassembly of the TDMU. So the virtual links formed by the TDMN system provides excellent QOS. Also, because of wide connection of the Internet, the TDMN system is a global wide two-way message system.